A NEW METHOD FOR PRICING SAP

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How do you know what to pay for sap? The *Maple Digest* has traditionally published sap prices each year in a table that is based on the sugar concentration of the sap. While you may think that sap pricing should be relatively simple and easy to understand, there are actually many factors that can and should affect sap prices. This article presents a new method for pricing sap and explains how it differs from the traditional pricing guidelines that have been posted annually in the *Digest*. Because there are other variables besides sap sugar content to consider, this article may seem a bit confusing at first. However, if you read through it carefully and experiment with the sap pricing table (available as a download from the Cornell Maple program website), you should be able to fully comprehend all of the concepts and ideas presented here.

First of all, it is important to understand that since sap is the raw material (and only ingredient) necessary in producing maple syrup, the value of the sap should be directly tied to the value of syrup (using bulk syrup prices). If sap pricing is based solely on sugar content, it only accounts for how many gallons of sap are needed to produce a gallon of syrup. In actuality, pricing should also be based upon the quality of syrup produced from that sap, the bulk prices for the grade of syrup produced, the cost of converting the raw sap to syrup, whether the sap is delivered or needs to be picked up, and the distribution of syrup (or bulk syrup revenues) between the person who gathers the sap and the person who processes that sap into syrup. In order to account for these additional variables, I developed an Excel-based sap price table that can be downloaded from the Cornell Maple Program website at http://maple.dnr.cornell.edu/sapbuying.htm. Downloading the spreadsheet and experimenting with it will greatly improve your understanding of sap pricing and the variables involved.

Once you have downloaded the spreadsheet, the only variable you need to input a value for is the "Percentage of Bulk Syrup Price Provided to Sap Seller" - this determines how to distribute the syrup (or syrup revenues) between the sap buyer and seller. Using this value, the spreadsheet does the rest of the work calculating sap prices based on various combinations of sap sugar content and bulk syrup prices. The formula used to determine the price of a gallon of sap is as follows:

= ((1/(87.1/ sap sugar content))*11.1382)* % distribution of syrup revenues * bulk syrup price

Table 1 provides a snapshot of the table when the sap seller receives 50% of the bulk price of syrup that is produced. This was chosen as the default value since it is the most commonly reported method for distributing syrup by people who boil sap "on shares". Once you download the spreadsheet, you can enter in whatever value works for your situation and the sap prices will change

accordingly. If the sap seller gets more than 50% of the syrup revenues, the prices will go up. Likewise, if the sap seller gets less than 50% of the syrup revenues, then of course the sap prices would be less.

Table 1. *Sap pricing table when the percentage of bulk syrup revenues provided to sap seller is 50%. Values are provided in the table as $/gallon of sap.*

Sap Sugar Content (%)	Bulk Syrup Price ($/lb)														
	$1.40	$1.60	$1.80	$2.00	$2.20	$2.40	$2.60	$2.80	$3.00	$3.20	$3.40	$3.60	$3.80	$4.00
1	0.09	0.10	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.20	0.22	0.23	0.24	0.26
1.1	0.10	0.11	0.13	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24	0.25	0.27	0.28
1.2	0.11	0.12	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.25	0.26	0.28	0.29	0.31
1.3	0.12	0.13	0.15	0.17	0.18	0.20	0.22	0.23	0.25	0.27	0.28	0.30	0.32	0.33
1.4	0.13	0.14	0.16	0.18	0.20	0.21	0.23	0.25	0.27	0.29	0.30	0.32	0.34	0.36
1.5	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33	0.35	0.36	0.38
1.6	0.14	0.16	0.18	0.20	0.23	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.39	0.41
1.7	0.15	0.17	0.20	0.22	0.24	0.26	0.28	0.30	0.33	0.35	0.37	0.39	0.41	0.43
1.8	0.16	0.18	0.21	0.23	0.25	0.28	0.30	0.32	0.35	0.37	0.39	0.41	0.44	0.46
1.9	0.17	0.19	0.22	0.24	0.27	0.29	0.32	0.34	0.36	0.39	0.41	0.44	0.46	0.49
2	0.18	0.20	0.23	0.26	0.28	0.31	0.33	0.36	0.38	0.41	0.43	0.46	0.49	0.51
2.1	0.19	0.21	0.24	0.27	0.30	0.32	0.35	0.38	0.40	0.43	0.46	0.48	0.51	0.54
2.2	0.20	0.23	0.25	0.28	0.31	0.34	0.37	0.39	0.42	0.45	0.48	0.51	0.53	0.56
2.3	0.21	0.24	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.59
2.4	0.21	0.25	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.61
2.5	0.22	0.26	0.29	0.32	0.35	0.38	0.42	0.45	0.48	0.51	0.54	0.58	0.61	0.64
2.6	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.66
2.7	0.24	0.28	0.31	0.35	0.38	0.41	0.45	0.48	0.52	0.55	0.59	0.62	0.66	0.69
2.8	0.25	0.29	0.32	0.36	0.39	0.43	0.47	0.50	0.54	0.57	0.61	0.64	0.68	0.72
2.9	0.26	0.30	0.33	0.37	0.41	0.45	0.48	0.52	0.56	0.59	0.63	0.67	0.70	0.74
3	0.27	0.31	0.35	0.38	0.42	0.46	0.50	0.54	0.58	0.61	0.65	0.69	0.73	0.77
3.1	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.55	0.59	0.63	0.67	0.71	0.75	0.79
3.2	0.29	0.33	0.37	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.70	0.74	0.78	0.82
3.3	0.30	0.34	0.38	0.42	0.46	0.51	0.55	0.59	0.63	0.68	0.72	0.76	0.80	0.84
3.4	0.30	0.35	0.39	0.43	0.48	0.52	0.57	0.61	0.65	0.70	0.74	0.78	0.83	0.87
3.5	0.31	0.36	0.40	0.45	0.49	0.54	0.58	0.63	0.67	0.72	0.76	0.81	0.85	0.90
3.6	0.32	0.37	0.41	0.46	0.51	0.55	0.60	0.64	0.69	0.74	0.78	0.83	0.87	0.92
3.7	0.33	0.38	0.43	0.47	0.52	0.57	0.62	0.66	0.71	0.76	0.80	0.85	0.90	0.95
3.8	0.34	0.39	0.44	0.49	0.53	0.58	0.63	0.68	0.73	0.78	0.83	0.87	0.92	0.97
3.9	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
4	0.36	0.41	0.46	0.51	0.56	0.61	0.66	0.72	0.77	0.82	0.87	0.92	0.97	1.02

Details of the Sap Price Table

In the sap pricing table presented in this article, sap sugar concentrations range from 1-4% at 0.1% intervals while bulk syrup prices range from $1.40 to $4.00/lb at $0.20 intervals. You can match up the sugar concentration and bulk syrup prices to figure out how much a gallon of sap is worth. The table provides the price per gallon of sap based on these two variables and whatever value is entered in for "the percentage of the bulk price of syrup given to the sap seller". In this example, that value is set to 50% and the sap prices reflect this equal sharing of revenues throughout.

There are a few important observations to be made about the sap pricing table. Not surprisingly, the higher the sugar concentration of the sap, the more valuable the sap is. Likewise, the greater the price of bulk syrup, the more money the sap is worth. For example, consider a gallon of sap that contains 2% sugar. If bulk syrup was selling for $3.00/lb, then the sap would be worth $0.38/gallon. If bulk prices were $2.20/lb, then the sap would only be worth $0.28/gallon. While this is only $0.10/gallon, that money adds up quickly, especially when thousands of gallons of sap are being bought and sold.

Since individual sugarmakers have no control over bulk syrup prices, rather than locking in a set price for sap before the season starts, it may be better to just agree on how to split the revenues once the syrup is sold. Waiting until the end of the season to be paid would be difficult for folks who want to know the prices beforehand and be paid whenever they deliver a load of sap. However, if the sap seller can wait for payment until after bulk syrup prices are set and/or the syrup is sold, then it could allow for a more equitable sharing of revenues. One possible compromise is to estimate what bulk prices will be before the season and then adjust payments (as needed) if the bulk prices wind up being different than what you thought they would be. This protects both parties from fluctuations in the bulk syrup market.

Distribution of Syrup Revenue using *Maple Digest* Prices

When using the method described in this article, you don't necessarily have to understand the complicated formulas that determine the sap prices. The only thing you really need to figure out is how to split the revenues between the sap seller and buyer- the spreadsheet does all of the calculations for you. The majority of people I have talked to either do a 50/50 split on the syrup produced, or try to figure out what the syrup is worth and split the revenues equally. How you decide to split the revenues should be based largely on how much it costs you to process the sap, whether you have to pick it up or it comes delivered to your sugarhouse, and the personal relationship you have with the sap seller. I've heard from many people who would like to split revenues on a 50/50 basis and also use the sap prices posted in the *Maple Digest* to pay their suppliers. However, this practice rarely winds up with a 50/50 split between sap sellers and buyers. Table 2 shows the percentage of the syrup revenues that winds up going to the sap seller using the 2009-2011 Digest prices based on various combinations of sap sugar content and bulk syrup prices.

Table 2. *Percentage of bulk syrup revenues given to sap seller when using the Maple Digest sap prices from 2009-2011. The values are given for different combinations of sap sugar concentration (SSC) and bulk syrup prices. For instance, when bulk syrup is $2.60/lb and SSC is 2.1, the sap seller receives 50% of bulk syrup revenues.*

Sap Sugar Content (%)	Bulk Syrup Prices ($/lb)														
	$1.40	$1.60	$1.80	$2.00	$2.20	$2.40	$2.60	$2.80	$3.00	$3.20	$3.40	$3.60	$3.80	$4.00
1	26%	22%	20%	20%	18%	15%	15%	14%	13%	13%	12%	11%	11%	10%
1.1	40%	34%	30%	30%	26%	23%	23%	20%	18%	18%	16%	15%	15%	15%
1.2	50%	45%	40%	36%	32%	30%	27%	26%	24%	23%	21%	19%	19%	18%
1.3	60%	53%	48%	42%	37%	35%	33%	30%	29%	27%	25%	23%	22%	21%
1.4	68%	60%	54%	48%	42%	39%	37%	34%	32%	30%	28%	27%	25%	24%
1.5	75%	65%	59%	51%	47%	44%	41%	38%	35%	33%	30%	29%	27%	26%
1.6	80%	70%	62%	55%	50%	46%	43%	40%	37%	35%	33%	31%	29%	28%
1.7	83%	72%	65%	58%	52%	48%	45%	41%	38%	36%	34%	32%	30%	29%
1.8	86%	75%	68%	60%	55%	50%	46%	43%	40%	38%	36%	34%	32%	30%
1.9	87%	78%	69%	62%	57%	52%	47%	44%	41%	39%	36%	34%	33%	31%
2	91%	80%	71%	64%	58%	53%	49%	45%	42%	40%	37%	35%	34%	32%
2.1	92%	82%	72%	65%	60%	55%	50%	46%	43%	41%	38%	36%	34%	33%
2.2	96%	84%	75%	67%	61%	56%	52%	48%	45%	42%	40%	38%	36%	34%
2.3	98%	85%	75%	68%	62%	57%	52%	49%	45%	42%	40%	38%	36%	34%
2.4	100%	87%	77%	70%	63%	58%	54%	50%	46%	43%	41%	39%	37%	35%
2.5	101%	88%	78%	70%	64%	59%	54%	51%	47%	44%	41%	39%	37%	35%
2.6	103%	90%	80%	72%	65%	60%	55%	52%	48%	45%	43%	40%	38%	36%
2.7	104%	91%	80%	72%	66%	60%	56%	52%	48%	45%	43%	40%	38%	36%
2.8	105%	92%	82%	74%	67%	62%	57%	53%	49%	46%	43%	41%	39%	37%
2.9	106%	92%	83%	74%	67%	62%	57%	53%	49%	46%	43%	41%	39%	37%
3	107%	94%	83%	75%	69%	62%	58%	53%	50%	46%	43%	41%	40%	37%
3.1	108%	94%	84%	76%	69%	63%	59%	54%	50%	47%	45%	42%	40%	38%
3.2	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	40%	38%
3.3	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	40%	38%
3.4	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	40%	39%
3.5	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	40%	39%
3.6	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	40%	39%
3.7	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	41%	39%
3.8	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	41%	39%
3.9	110%	96%	85%	77%	70%	64%	59%	55%	51%	48%	45%	43%	41%	39%
4	110%	96%	86%	77%	70%	64%	59%	55%	51%	48%	45%	43%	41%	39%

At the current prices for bulk syrup and average sugar contents, the distribution of syrup revenues tends to hover around 50%. However, if bulk syrup prices are low, using the typical Digest prices results in distributions to the sap seller much higher than 50% of the bulk syrup revenues. On the contrary, if bulk syrup prices are higher than expected, the sap seller winds up getting much less than 50% of syrup revenues. When considering sap sweetness, low sugar sap winds up giving far less than 50% to the sap seller whereas high sugar sap results in distributions that exceed 50% in most cases. This phenomenon occurs because the Digest prices are weighted to pay more for sweet sap and proportionately less for low sugar content sap. It takes less time and fuel to process sweet sap than it does low sugar sap, and sweeter sap usually tends to make higher quality syrup, so sap sellers are compensated proportionately more for sweeter sap.

While this practice makes a lot of sense for small producers, it is not as necessary for large producers with energy efficient ROs and evaporators. The fuel and time costs are much lower when you have efficient equipment, so you don't need to offer a lot less money for lower sugar content sap than you do for high sugar sap. On the other hand, for small producers who spend a lot of time and fuel processing sap- this type of stratified distribution makes sense.

Advanced Distribution Calculator

Because it often makes sense to change the revenue distribution based on sap sugar content (SSC), I have created an advanced sap price table that

allows users to add this feature. It lets you set the target figure for your "normal" distribution of syrup revenues and then specify the % change in revenue distribution for a given % change in SSC. Producers who have relatively high fuel and time costs for processing sap may want to tie revenue distribution closely with SSC. On the other hand, producers who can process sap quickly and cost-effectively may not need to change the revenue distribution very much based on sap sugar content. This advanced calculator allows you to tailor the revenue distribution according to your particular situation. If you would like to use this feature when pricing sap, you can download the sap pricing file from the Cornell Maple website and click on the worksheet entitled "advanced % calculator". If you don't use this feature, all of the syrup revenues will be allocated at the one percentage you specify. However, if you would like to pay less for low sugar sap and are willing to pay more for higher sugar sap, then you should definitely use the advanced calculator.

The Economics of Buying Sap

Just talking about pricing can get complicated enough, so I have only focused on sap prices in this article. The next installment will discuss the economics of buying sap- how to determine if it makes economic sense for you to buy sap and what percentage of the syrup (or syrup revenues) you can offer to folks who sell you sap. As a quick preview, it is difficult for small producers to buy sap and make any money, especially if you don't have very efficient equipment

or a lot of spare time to boil extra sap. On the other hand, it is usually very economical for large producers to buy sap, especially if you have efficient equipment and could find more time to process sap.

Additional Help is Available

If you decide to use this method for pricing sap and have any questions, I can usually be reached by calling (518) 523 9337 or mlf36@cornell.edu I realize that not all producers are comfortable using Excel, so if you need assistance, please call or email at any time. You can also go to the Cornell Maple Program website and watch an archived webinar on how to price sap and use the Excel spreadsheet- go to www.cornellmaple.com for more information.

2012 SAP PRICES

We normally publish sap prices in this issue, but are not doing so this year. Please refer to the previous article "A New Method for Pricing Sap" by Michael Farrell for an in-depth explanation of sap prices. It includes a table that provides sap prices based on an equal sharing of revenue between the sap buyer and seller. The sap price table can be downloaded from http://maple.dnr.cornell.edu/sapbuying.htm and you can reach Michael at (518) 523-9337 or mlf36@cornell.edu with any questions.